

tive to the giardia in the duodenum. From my experience, neo-arsphenamine into the vein is not particularly harmful to the amœba. Stovarsol internally has been much more efficacious in my cases.

We shall advance rapidly in treatment as well as in pathological proof of the harmfulness of these organisms, when someone cultivates them in pure culture. What we need is their isolation and culture in the same manner we cultivate typhoid and diphtheria organisms. At present the clinical expression of these parasites should lead us in regard to their treatment.

I have no sympathy with the contention that only one organism, the ameba, out of the great group of protozoa can be harmful to mankind. That contention would be analogous to claiming that there is only one insect injurious to farm crops.

RICKETS

Langley Porter, who has been in Europe traveling and studying for over a year, sends the following resumé of our knowledge of rickets.—EDITOR.

Rickets is a disease affecting all the bodily tissues, especially the osseous, the nervous, the muscular, and the epithelial. The changes in the bones are the most visible, especially in the earlier stages of the disorder. For this reason and also because the x-ray can be used to record even the earliest of such changes rachitic anomalies of ossification and of bone structure have been much studied also. The fact that extreme degrees of bony change lead to deformities that interfere with skeletal function lends further interest to studies of the osseous changes in this disease.

The changes in the nervous tissues tend to establish conditions of heightened irritability and diminished inhibition; conditions that are the basis of the clinical entity which is called tetany and whose symptoms are ready access of convulsive seizures, facial irritability, carpopedal spasm, laryngo spasm, emotional instability and anomalies of behavior. These discernable tissue changes are, however, the results of an alteration of metabolism which is revealed by a change in the ratio of calcium to phosphorus in the blood serum and by a decrease in its contained bases, a relative acidosis. This metabolic imbalance is brought about by some noxious influence acting on the rapidly growing tissues. Present opinion holds that this noxious influence is permitted to act because the body receives an insufficient stimulation of radiant energy, especially of that form of radiant energy which emanates from the violet part of the spectrum in waves of a length close to 300 mm. Such radiant energy appears to be essential in order that the chemistry of the tissues should proceed with optimum energy and the metabolism produce normal growth.

The radiant energy is received directly from the impingement of sunlight on the body and indirectly from accessory foodstuffs, especially the fats and the green leaf vegetables in which it is stored in static form. After digestion, metabolism has the power to transform this static energy to dynamic in a form that acts on the chemical events that happen in the body in such a way that it increases their speed and vigor. Apparently, through the aid of these accessory foodstuffs which we call vitamins, the whole series of oxidations and reductions which constitute life is speeded up and perfected. Apparently each

grown individual has his own quantitative need for such radiant energy. If he fails to receive all that he needs, he develops rickets.

In most latitudes under usual conditions of housing, climate and clothing, the direct radiations that reach the growing human do not suffice to supply his optimum needs, therefore, it becomes necessary to make up the lack by the ingestion of such foodstuffs as have the radiant energy stored in the forms we call vitamins. An especially rich source lies in cod-liver oil. The fats of milk, from properly housed and pasture-fed cattle, and the green leaf vegetables, are the most dependable and available sources of supply.

Recently, apparently successful attempts have been made to increase the radiant energy content (vitamin value) of such foodstuffs by subjecting them to the influence of violet-rays originating in mercury vapor lamps and quartz lenses. The winter season and substances suspended in the atmosphere such as fog, cloud, smoke and rain, may prevent a large part of the violet emanations from reaching the human body. Window-glass and the usual clothing provide further hindrances. For these reasons it is necessary, especially during the winter months, to insure to the growing child a full supply of vitamin containing foods. This we can do most certainly by feeding cod-liver oil in addition to milk fat, green leaf vegetables, egg yolk, and the juice of the citrus fruits, and the tomato. Heliotherapy, or radiation with mercury vapor lamps, will give an added insurance against the development of rickets. It must not be forgotten, however, that the ingestion of an ample supply of antirachitic vitamin is no certain preventive of rickets. For the patient may be subject to disturbances of digestion, of assimilation that interfere with the proper absorption and the utilization of vitamins. On the other hand, he may be the victim of some parental infection or intoxication which hinders that acceleration or stepping up of metabolism which is normally consequent upon the influence of radiant energy, whether it be derived directly from light or indirectly from the supplies stored in the vitamin carrying foods. The consideration and cure of all such illness is imperative in all attempts to prevent or to cure rickets.

384 Post Street.

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